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|  | **Unit 1: Biochemistry** | | | | | | | |
| Name: | | Start Date: | | | 08/28/17 |  |  |  |
|  | | Test 1 Date: | | | 09/25/17 |  |  |  |
| Period: | | Teacher: Ms. Jost | | | |  |  |  |
|  | |  |  |  |  |  |  |  |
| **BIOCHEMISTRY** | | Submitted | Resubmit | Correct | Evidence of Learning | Page # | Date | Sign-Off |
| **Objective 1:** Compare the structures & functions of the major biological molecules, organic and **inorganic**, as related to the survival of organisms | |  |  |  | **Catalyst: Density**  **Lab: Properties of Water Investigation**  **Notes: Properties of Water**  **HW: Properties of Water Review** |  |  |  |
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|  |  |  | **Catalyst: Why do we need water?** | 8 |  |
|  |  |  | **Notes: Biomolecules** | 3 |
|  |  |  | **Lab: Food Labels** | 8 |
|  |  |  | **HW: Biomolecules Crossword** | 11 |
|  |  |  | **Catalyst: Breakfast Counsel**  **Lab: Biomolecule Indicator** | 5 |  |
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|  |  |  | **Catalyst: Subject Sort**  **Activity: Chemistry of Carbs, Lipids, Proteins** | -- |  |
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**Unit 1: BioChemistry**

Start Date: 08/28/17

Test 1 Date: 09/25/17

**Objective 1:** Compare the structures and functions of the major biological molecules, organic and inorganic, as related to the survival of organisms.

*Essential Question:* What are the subunits and functions of the four major groups of organic molecules?

*Essential Question:* What are the properties of water?

*“I Can” Statements:*

* Compare and contrast the four major organic macromolecule groups in terms of:
  + The formative elements
  + The formative subunits (monomers)
  + Functions within the cell/organism
  + Where found in the diet (food sources)
* Describe the major properties of water and explain the importance of these properties in the context of sustaining life:
  + Universal solvent
  + High specific heat
  + Adhesion and cohesion
  + Capillary action
  + Density

**Objective 2:**  Explain how enzymes act as catalysts for biological reactions.

*Essential Question:* How and why do enzymes catalyze biological reactions?

*“I Can” Statements:*

* Demonstrate the link between shape and function as it relates to an enzyme-substrate complex, as well as the effects of environmental factors (temperature, pH) on enzyme efficiency
* Develop a cause-and-effect model for specificity of enzymes

**Vocabulary**

* Activation Energy
* Adhesion
* Amino Acid
* Capillary Action
* Carbohydrate
* Catalyst
* Cohesion
* Denature
* DNA
* Density
* Enzyme
* Fatty Acid
* Hormone
* Inorganic
* Lipid
* Macromolecule
* Monomer
* Monosaccharide
* Nucleic Acid
* Nucleotide
* Organic
* Peptide Bond
* Polarity
* Polymer
* Polysaccharide
* Product
* Protein
* Reactant
* RNA
* Solvent
* Solute
* Substrate

**Major Properties of Water Investigation**

**Directions**: There are 7 stations around the room, each with an experiment or activity to illustrate one of the 7 different properties of water. Follow the directions provided at each station and answer the questions for each station as you go.

|  |  |
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| ***7 properties of water!*** | ***Data and Analysis*** |
| **Station #1: Density- (Liquid vs Liquid)**  Density is a measurement of the degree of compactness of molecules in a substance. The formula for density is mass ÷ volume, and is typically measured in g/mL. At this station you will test the densities of different liquid and compare them to each other. | **Part I**  **1. What is the density of water? Show your work.**  **2. What is the density of oil? Show your work.**  **3. What is the density of isopropyl alcohol? Show your work.**  **Part II**  **4. What happened when you add all three liquids into the same container?**  **5.Write the order of liquid from top to bottom.**  **6. Which liquid did you expect to be on the bottom? Why?**  **7. Which liquid was actually on the bottom? Why?** |
| **Station #2: Density continued (solid vs liquid).**  One unique property of water is that, unlike most substance, water is less dense in solid form. This is a result of the way water molecules arrange themselves when frozen. | **1. What happened when you initially put the ice in the oil?**  **2. What happened when the ice began to melt? Why?** |
| **Station #3: Adhesion**  Adhesion The term adhesion is derived from the Latin verb “adhaereō” meaning “I cling or stick to”. When describing water molecules, the term describes the property of water molecules to be attracted to molecules of other substance. | **1. Which tool did you chose to use and why?**  **2. How did you successfully transfer the water from one beaker to the next?**  **3. Thinking about the term “adhesion”, what do you think the water molecule are adhering or sticking to?** |
| **Station # 4: Cohesion**  The prefix “co-“ means “together; joint or jointly”. In the case of water, the slight charge or polarity of water molecules makes them attracted to each other and thus able to form droplets and strong surfaces. | **1. How many drops of alcohol were you able to get to stay on the penny?**  **2. How many drops of water were you able to get on the penny?**  **3. Thinking about the property of cohesion, what do your results suggest about cohesive forces within water compared to alcohol?** |
| **Station #5: Solvent Ability**  Water is often referred to as the “universal solvent” because of its ability to dissolve most things. While any polar substance can be dissolved by water, the same is not true for nonpolar substances like those composed of lipids.  Polar= slight charge, dissolvable by water  Nonpolar= no charge, not dissolvable by water  \*like dissolves like\* | **1. What happened when you added salt to Cup A?**  **2. What happened when you added sugar to Cup B?**  **3. What happened when you added oil to Cup C?**  **4. For each of the following substances you tested, propose whether they are polar or nonpolar and explain why.**   |  |  |  | | --- | --- | --- | | **Substance** | **Polarity** | **Explanation** | | Salt |  |  | | Sugar |  |  | | Oil |  |  | |
| **Station #6: Capillary Action**  The same property that allows us to drink from straws and for plants to get water up their roots, capillary action allows water to defy gravity. Using a mix of adhesive and cohesive forces, water is able to climb upwards against gravity. | **1. What happened when the water reached the ink?**  **2. Using what you know about cohesion and adhesion, what two things were the water molecules adhering to in this experiment?** |
| **Station #7: pH**  pH stands for “potential of hydrogen”. This value is use to measure how acidic or basic a solution is in term of the concentration of hydrogen ions. Pure water is said to have a pH of 7 which is neutral. Based on the pH scale, solutions with a high concentration of H+ ions are considered acidic and have a pH value above 7, where solution with a higher concentration of OH- ions are considered basic and have a pH value below 7. pH strips are indicators that change color according to the concentration of different ions in a solution. | **1. What is an indicator? How are pH strips an example of an indicator?**  **2. Which solutions were acidic?**  **3. Which solutions were basic?** |
| **Station #8: High Specific Heat**  Because of the unique attraction of water molecules to each other, it requires a lot of energy to break the bonds between water molecules and increase the temperature of water. This is a big part of the reason why our blood doesn’t boil when we stay out in the sun or in warmer climates. | **1. Referring to the picture of the beach, what do you think is hotter, the sand or the sun? Explain why.**  **2. Why might this be an especially important property when it comes to aquatic organisms?**  **3. What do you think the definition of Heat Capacity is?** |

**Notes: Properties of Water**

**Properties of Water Review**

1. Write the chemical equation for water. \_\_\_\_\_\_\_\_\_\_\_\_

2. Sketch a model of a water molecule, show polarity by labeling positive and negatively charged regions of the molecule.

3. How is a water molecule like a magnet? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What causes surface tension in water?

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5. Give an example that you observed of surface tension.

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6. Define cohesion in your own words. Give an example.

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7. Define adhesion in your own words. Give an example.

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8. How does water get to the leaves in the tops of the tallest trees against the force of gravity? Name property responsible for this and explain how it works.

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9. Why is solid water less dense than liquid water?

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10. In the space below, write a short paragraph explain **two** different properties of water and why they are important for sustaining life.

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